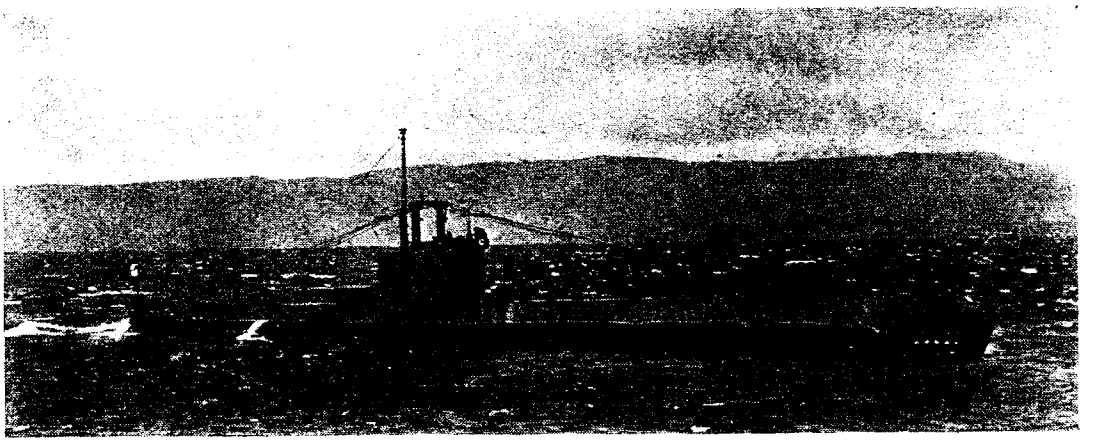

H.M.S. 'SUBTLE'—MODERNIZED 'S' CLASS

NOTES FROM SEA

The following are extracts from letters received from Engineer Officers of sea-going ships, together with remarks by the Engineer-in-Chief's Department, where appropriate.

Boilers—H.M.S. 'Implacable'

Combustion tubes, Pattern No. 15875. The method of securing the support stays to the combustion tube is considered inadequate. After a brief period of steaming the rivets burn through and the tube drops off.

This has been overcome by welding the support stays to the combustion tubes using *Murex Nicrex* 1 electrodes (nickel-chrome).

Comment

The material now used for all combustion tubes, supports and rivets is heat resisting steel, though during the war aluminized mild steel was often used for economy reasons.

If further failures occur, new combustion tubes complete with supports should be fitted—the work being done as a defect item. Adequate stocks are held in H.M. dockyards.

Evaporators—H.M.S. 'Ocean'

Both main sets gave much trouble towards the end of the period, and the distiller shells were found to be leaking at several points, especially the end flange seams. The hull and pipe vibration is considered to have caused these leaks. Both shells were removed by dockyard and lead wiped. One needed several attempts to withstand the test pressure.

Comment

Redesign of the distiller shell is being considered and it is hoped to encourage manufacturers to adopt a welding technique that will overcome the leakage experienced.

Main Circulators—H.M.S. ' Gambia '

The lubricating oil in the sumps of the main circulating pump suffers considerably from water contamination and frequent oil changes are necessary. It would be interesting to know if this is a common trouble.

Comment

Other ships have reported this trouble which is usually caused by leaking carbon packing or defective ' gitseals '. On one occasion when water contamination was considerable it was found that the ' gitseals ' had been fitted the wrong way round.

Lubricating Oil—H.M.S. ' Euryalus '

The demulsifying properties of O.M.88 or 100 seem poor compared with pre-war S.M.L.O. (unless memory is playing tricks !). No. 1 turbo-generator suffers a lot from water contamination due to condensed gland steam being blown along the shaft into the gearcase. The orange coloured emulsion after standing 24 hours in a test tube was still an orange coloured emulsion with no water separated out. The *Vickcen* separator does however do its stuff and can be relied on to get the oil almost clear.

Comment

This is by no means an isolated instance of the poor demulsifying properties of O.M.88 and O.M.100 being reported from sea. Accordingly, Fleet and Squadron Engineer Officers have been asked by E.-in-C. to report any further instances, at the same time sending 20 gallons of the suspected oil to the Admiralty Oil Laboratory for analysis.

Evaporators—H.M.S. ' Birmingham '

Following are some of the chief defects which have occurred, with their remedies :—

(*a*) *Inability to ' brine ' satisfactorily*

This was discovered during trials by the dockyard at Portsmouth, but evaporators were accepted due to the urgent operational commitments of the ship.

In temperate waters, the shell densities remained within reasonable limits, but as soon as the ship proceeded to tropical waters the symptoms were aggravated.

Much dismantling and inspection of brine systems occurred before it was decided that the fault lay in the design of the brine system itself.

The brine suction pipes had been modified in 1951 in accordance with A. and A. Item No. 985, but during the modification several additional right-angled bends had been inserted, some of them being immediately after the diluting valve nozzles.

Satisfactory modifications were carried out on one evaporator by ship's staff, and on the other set by S.S.K. Dockyard, Sasebo. No further trouble has been experienced, and shell densities are now kept at a maximum of 20° in all sea water temperatures.

(*b*) *Erratic Feeding*

The feed regulators originally fitted were of the rotary sleeve type. These wear very rapidly, and it has been found by experience that after a week's running it is necessary to resort to hand control to prevent the shell from filling up. The unreliability of this type of regulator is well known, and it is believed that most, if not all, evaporators so fitted are operated by hand control.

Piston valve type regulators have been made and fitted and have proved themselves completely reliable, and since the effective operation of these valves is independent of any wear that may take place between piston and liner, there seems to be no reason why they should not continue working indefinitely. Since these valves were fitted, however, it was found necessary to modify the feed strainers, which were originally made from brass plate with $\frac{3}{16}$ in diameter holes. These allowed small shells and prawns to pass through to the regulator, causing the piston to jam. They have now been replaced by $\frac{1}{16}$ in mesh gauze strainers.

(*c*) *Variation in Steam Pressure*

This has been overcome by fitting all coil steam valves with orifice nozzles ·632-in in diameter. This figure was calculated for working at a 15-in shell vacuum, using information provided in the *Journal*, Vol. 1, No. 4, of January 1948. In addition to the advantage of working with a constant flow of steam, it is also possible to ascertain the state of the coils at any given time. Coil steam pressures (with the coil steam valve wide open) vary from 4 to 20 lb/sq in depending on how long ago the coils were removed or the evaporator blown down.

(*d*) *Low Output*

Consequent on the modifications carried out in (*a*), (*b*) and (*c*), the output of each set of evaporators has increased from a rather shaky $2\frac{1}{2}$ tons/hour to a steady $3\frac{1}{2}$ tons/hour while distilling to M.U.F., the salinities of made water varying between ·03 and ·06 grains per gallon. To achieve this, the vapour valves are opened four turns.

When distilling to ship's tanks, it is possible, by opening the vapour valves to seven turns, to produce up to 4 tons/hour at a salinity of 0·35, but this is only resorted to in an emergency, since the high salinity is sufficient to cause a cloud in the ejector condenser drain, which has then to be put on the bilge, with consequent loss of feed water.

The figures for output were taken after steaming for 3,500 hours on the same set of coils. Evaporator compound is injected continuously.

In addition, the lot of the watchkeeper has been improved in that from being mentally and physically exhausted at the end of the watch, he now has virtually nothing to do except blow-down and descale every forenoon. By resiting gauges on the forward set, it has been found possible to make the No. 3 turbo-generator watchkeeper responsible for the evaporator as well, thus releasing four men for other duties.

(*e*) *Choking of Internal Brine Pipes*

The original internal brine pipe was open-ended, and scale falling into the well was sucked into the pipe, causing chokes in the brine system. The pipe ends have now been blanked and $\frac{1}{4}$ in holes have been drilled throughout the length of the internal portion.

(*f*) *Too Rapid Compound Injection*

Fine-adjustment valves, of the type illustrated in the *Journal*, Vol. 1, No. 4, of January 1948, have been made and fitted.

(*g*) *Fluctuating Distiller Vacuum*

The circulating water for the ejector condenser was supplied direct from the outlet end of the distiller. After the ejector condenser, it supplied cooling water for the coil drain cooler, and from there went direct to the feed regulators. When the evaporator shells stopped feeding, even momentarily, the flow through the ejector condenser ceased and a steam pressure was built up, causing a small drop in distiller vacuum. This was sufficient to cause a temporarily high salinity.

The system has been modified so that the ejector condenser outlet discharges into the circulating water pump suction. A separate lead has been taken from the distiller to the feed heater, and thence to the feed regulator. This has further increased the steady working of the evaporators.

Comment

This is a most useful contribution, containing much information of practical application elsewhere, as well as showing commendable resource and ' drive '.

Any steps taken to improve the reliability and output of evaporating plants are of the greatest interest to E.-in-C. Where, in addition, these result in the release of watchkeepers for other duties, as in (*d*) above, a contribution to the solution of the present manning problem has been made. Such a release of watchkeepers should help in overcoming the arrears of maintenance which are known to exist in nearly every ship in the Fleet.

It is noted with interest that Admiralty Evaporator Compound is being employed effectively, as indicated by the output after 3,500 hours running.

Boilers—H.M.S. ' Morecambe Bay '

Whilst on passage and steaming on No. 2 boiler only, a number of tubes on the right hand (starboard) side were seen to be glowing red. No. 1 boiler was immediately connected and No. 2 boiler shut down. This same phenomenon occurred on the left hand (starboard) side of No. 1 boiler about six hours later. A force 7 wind was blowing on the port beam at the time, and it was peculiar that the tubes affected, although on opposite sides of the boilers, were on the same side of the ship. No. 2 boiler was emptied, all 'A' row tubes searched and sighted, no obstruction being found. Examination externally revealed a slight discolouration at the position of apparent glowing. Both boilers were reconnected and the ship proceeded at reduced speed.

On arrival in harbour, the same procedure was carried out on No. 1 boiler, no obstruction being found. The boilers were examined by the Fleet Engineer Officer personally and pronounced satisfactory. The discolouration had disappeared.

Tests were taken of boiler and feed water and found satisfactory. A sample of fuel oil used, however, showed under analysis that its flash point was approximately 244°F, and therefore not suitable for use. This oil had been obtained from the *Brown Ranger* and only Nos. 5, 6, 7 and 8 tanks were filled.

Later, whilst on passage, experiments were carried out at different speeds and sprayer temperatures. The glowing persisted, first at the back and then at the front of each boiler, in relation to the direction of the wind blowing at the time.

A theory that a pocket of wind in the funnel blocked the path of escaping gases causing subsequent burning of unconsumed deposits in the tube nests seemed to be substantiated. By the time port was reached, all the oil in Nos. 5, 6, 7 and 8 tanks had been used.

The ship was re-fuelled by the *Green Ranger* and no further glowing has been seen although the ship has steamed under similar conditions and wind force. Attempts to photograph this phenomenon were unsuccessful.

The inner funnel consists of two semi-circles 7 feet in diameter forward and aft separated by 18 inches of parallel side. The total height from the top of the steam drum is 30 feet and the uptakes are divided to within 8 feet of the top. It is assumed that the ship would be steaming on three 900 lb. sprayers at about 140 lb/sq in. at the time of the incidents.

Note by Fleet Engineer Officer

With regard to the fuel test, it was the viscosity (255·8 S.S.U. at 122°F) which was considered high and not the flash point. Whilst the viscosity quoted is within the specification limits mentioned in B.R. 16, Article 431, it is outside the limits for U.S. Navy Special Fuel (maximum 225 S.S.U. at 122°F) which R.N. ships have been using in Japanese and Korean waters. The test results on *Morecambe Bay*'s fuel sample obtained by U.S. Quartermaster's Petroleum Products Laboratory at Sasebo were as follows :—

Gravity °A.P.I.	20·2 (·9325 S.G.).
Flash point (P.M.C.C.)	275°F.
Viscosity S.S.U. at 122°F ..	255·8 (224 Redwood No. 1).
Carbon residue per cent. by weight	6·58.
Ash per cent by weight	0·0125.
Water and sediment per cent by volume.	0·52.

Comment

The viscosity at 122°F is admittedly above that allowed by Specification MIL.F.859A. This, however, should not cause the phenomenon referred to. The flash point of 275°F is higher than normal, but the specification lays down no maximum value for this characteristic. The fuel, although just outside U.S. Navy Special Specification is well within Admiralty Specification.

As far as E.-in-C. is concerned, this must be considered a phenomenon ; although from time to time vague reports of similar occurrences have come to hand.

Naturally, this report will be noted in relation to future ' wear and waste ' test reports, but on the evidence forwarded of the detailed investigations carried out, it would seem probable that no damage has resulted. It is disturbing, to say the least, to find the boiler tubes apparently glowing. The steps taken were prudent and the efforts to establish the cause were thorough and logical.

Any other instances of this phenomenon should be reported, with the details of steaming conditions existing at the time, and any theories advanced as to its cause.

Domestic Boiler—H.M.S. ' Bramble '

In H.M.S. *Bramble* the completion of the A. & A. to fit larger domestic boiler and calorifier has proved its worth in supplying ample hot water when not under steam. Unfortunately, however, the habitability of the officers' galley has

deteriorated badly due to radiation from the boiler. Note was taken of this fact by E.-in-C.'s and D.N.C.'s representatives on board for habitability trials and ship's staff will endeavour to lag the outside of the boiler to improve the situation. It is a pity that these domestic boilers cannot be lagged either before or when being fitted.

Comment

Subsequent to the habitability trials by Admiralty representatives, instructions will be issued to ships of 'Algerine ' class in which the domestic boiler is already fitted in the officers' galley, to insert an item in the White Defect List at the next refit, for the boiler to be lagged with 1 inch thickness plastic asbestos or similar material.

In ships not yet fitted, the lagging should be carried out in conjunction with A. & A. Item No. 370.

Auxiliary Machinery—4th Minesweeping Squadron

The auxiliary machinery is generally satisfactory, requiring an average amount of maintenance and having no recurrent defects. On opening up *Laertes*' turbo-generator during refit it was found that the second stage rotor blade tips had been fouling, the set screw which secures the stator blades in the bottom half having fractured and moved upwards enough seriously to wear the rotor blading. The rotor wheel itself was also found to be slightly slack on the spindle. The machine is of 120 kW, manufactured by Worthington Pump and Machinery Co.

Comment

Several instances have occurred with this type of machine of the shrunk-on blade wheels becoming slack on the rotor, and while a few spares are being obtained under American aid, it is hoped that investigations by Portsmouth Dockyard will enable this defect to be remedied by the home manufacture of an improved design of the rotor shaft.

Heat Exchangers—H.M.S. ' Magpie '

Heavy scaling of the water side of tubes is rapid in Mediterranean waters. Application is made for Admiralty approval to acid clean in accordance with B.R. 16(50), Article 146(6) as refits become imminent, but a general statement of the position regarding this treatment for aluminium brass tubes would be welcomed.

Ships with reciprocating auxiliaries suffer some external greasing and there appears to be no process available locally for degreasing. Admiralty guidance on this is required, B.R. 16(50), Article 146(7) refers.

Comment

Approval to descale aluminium brass tubes is just about to be given.

Firms are not yet in a position to carry out the trichlorethylene degreasing process at yards abroad and permission is not granted to dockyards or ship personnel to use it. However, there is a ready alternative in ' Greeskilla ' which was used satisfactorily in *Dainty* and which could be made a R.B. item. Instructions are being issued in due course by the appropriate section at Admiralty.